REMARKS

Claim 1 is amended to indicate that the first and second electrodes are electrically isolated, that they are in mutual proximity, that at least a majority of each of their respective areas are both vertically and horizontally offset, and to improve antecedent basis. Claims 2 and 3 have been amended to recite "both" the horizontal and vertical offset of the first and second electrodes. Claim 4 has been amended to recite that the first and second electrodes are both vertically and horizontally spaced from one another. Claims 9 and 12 have been amended to more positively recite the coupling of the control circuitry to one of the first and second electrodes, and claim 9 to recite that the other of the first and second electrodes is coupled to a reference voltage. Claim 21 has been amended in a manner similar to claim 1, but in a method context. Claim 22 has been amended to enhance antecedent basis. No new matter has been added.

The Final Office Action mailed May 6, 2004 and the Advisory Action mailed August 11, 2004 have been received and reviewed. Claims 1 through 14 and 16 through 29 are currently pending in the application. Claims 1 through 14 and 16 through 29 stand rejected. Applicants wish to thank the Office sincerely for the clarification to the rejections offered in the Advisory Action.

Information Disclosure Statement

Applicants note the filing herewith of a Supplemental Information Disclosure Statement and respectfully request that the information cited on the accompanying PTO/SB/08 be made of record herein.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,135,485 to Cohen et al. in view of U.S. Patent No. 4,601,201 to Oota et al.

Claims 1 through 6, 13, 14, 16, 17 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cohen et al. (U.S. Patent No. 5,135,485) in view of Oota et al. (U.S. Patent No. 4,601,201). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 1-6, 13, 14, 16, 17 and 20 are improper because the Office has apparently again misunderstood the teachings of both the Cohen et al. and the Oota et al. reference.

Applicants have amended claim 1 to further emphasize that the first and second electrodes of their claimed sensor are not only mutually cooperative, but also mutually electrically isolated and arranged inn mutual proximity such that at least a majority of each of their respective areas are both vertically and horizontally offset from each other. This amendment does not reduce the scope of the claims, but is merely a further attempt to clarify the claimed structure in the Office's perception in distinguishing it from the art as applied and as attempted to be combined in the rejection.

With respect to claim 1, as noted in Applicants' prior responses, the electrodes 10, 12 of Cohen et al. do not have a majority of their respective areas both horizontally *and* vertically offset from each other. Using the Cohen et al. drawing figures relied upon by the Office as examples, it can be seen that, in FIG. 2, electrodes 10 and 12 are vertically offset (one above the other) but are, in major part, horizontally overlapping. Claim 1 requires that a majority of the electrode areas be both horizontally *and* vertically offset. Similarly, FIG. 7 of Cohen et al. illustrates electrodes 10, 12 which are horizontally offset (side by side) but are, in major part, vertically overlapping. Thus, in one embodiment of Cohen et al. the electrodes are vertically offset and, in another embodiment, they are horizontally offset, but in *no* embodiment are a majority of the respective areas of the electrodes both vertically *and* horizontally offset from one another. The Office also points to FIG. 3 of Cohen et al., but FIG. 3 is substantially similar to

FIG. 2 and affords no additional teaching. Moreover, the Office has not identified any motivation or suggestion within Cohen et al. to *combine* the embodiments of FIGS. 2 and 7. Further, in the Advisory Action the Office mentions FIG. 6 of Cohen et al., wherein plates 80 and 82 are asserted to be placed in a pattern that would make it possible to detect discrete levels of fluid. While Applicants appreciate this teaching, this does not add anything to the teachings of FIGS. 2 and 7 but, rather, reiterates the teachings of FIGS. 2 and 3, which teach substantial (more than a majority) horizontal electrode overlap with vertical spacing.

With respect to Oota et al., Applicants respectfully assert that the Office is misreading the teachings thereof. First, there are not mutually cooperative, mutually electrically isolated electrodes placed "where a majority of their areas are vertically and horizontally offset (zig-zagged) from each other (Figure 1A)." As noted in Col. 3, lines 50-54 and Col. 4, lines 34-68 (with respect to FIGS. 2A and 2B), the segmented electrodes 21*a* – 21*n* are part of the **same electrode** of a pair of electrodes. In other words, printed substrate 20 and electrodes 21*a*-21*n* thereon comprise a *single, segmented* inner electrode, the segments of which do not cooperate with each other to provide a capacitance-based output. Rather, each of the electrode segments separately cooperates with outer electrode 14 which is electrically isolated therefrom (but not from the liquid in the container). In use, each electrode segment 21*a* – 21*n* may be driven by a shift register 23 and electrical signals are taken out of outer electrode 14, the signals being a current of varied quantity depending on the medium (air or gasoline) presenting between each segment segments 21*a* – 21*n* and its laterally adjacent portion of outer electrode 14 (Oota et al., Col. 4, lines 47-54).

Any of the segmented electrodes 21*a* – 21*n* are not mutually cooperative, in that sensing cannot take place between any two adjacent electrodes 21*a* – 21*n*. Rather, each given segment of electrodes 21*a* – 21*n* individually cooperates with a laterally adjacent portion of outer electrode 14. Outer electrode 14 (see Col. 3, line 65 through Col. 4, line 10) is a metallic pipe that extends substantially the entire length of inner printed circuit 20 and the entire span of electrodes 21*a* – 21*n*. Thus, outer electrode 14 vertically overlaps *each* electrode segment 21*a* – 21*n* as well as *all* of electrode segments 21*a* – 21*n*.

Applicants also note that outer electrode 14 is in contact with the fluid within tank RS on both the exterior of electrode 14 and the interior thereof, through holes 14'. Oota et al. provides signals of liquid level in tank RS by virtue of the capacitance between one of the inner electrode segments $21a - 21n$ and a laterally adjacent portion of outer electrode 14, *not* between two of the inner electrodes $21a - 21n$ (Col. 5, lines 19-22). Therefore, Oota et al. fails to address the deficiencies in Cohen et al. due to the lack of both vertically *and* horizontally offset mutually cooperative, mutually electrically isolated electrodes and because outer electrode 14 is not "in isolation from the interior volume of the container" as required by claim 1.

Moreover, due to the difference in structure and mode of operation between Cohen et al. and Oota et al., there would be no motivation to combine the references *or* any reasonable expectation of success of making the asserted combination. The only possible motivation or suggestion for combining the two references would appear to reside in Applicants' own specification which, the Office will readily acknowledge, would constitute impermissible hindsight.

While the Office correctly states the test for proper combination of references, Applicants respectfully assert there is 1) no motivation or suggestion to combine embodiments of Cohen et al., 2) no motivation or suggestion to modify the teachings of Cohen et al. with the teachings of Oota et al. due to the latter's significantly different operational mode (use of one electrode in contact with the fluid being measured and another one in contact therewith) and 3) no reasonable expectation of success for the combination due to the different operational modes. Accordingly, the rejection is unsupported by the attempted combination of references and Applicants respectfully request that it be withdrawn. Further, as noted above and previously, Oota et al. does not support the teaching asserted by the Office for curing the deficiencies in Cohen et al.

Applicants note that the Advisory Action cites Oota et al. for the proposition that "Oota et al. teach where the electrodes are placed in zigzag fashion (Abstract; Column 4, line 41 where most of the areas (both horizontal and vertical) are not overlapping. Oota et al. explain that this is done because the liquid level can lie just between two adjacent electrodes and the accurate detection can be made (Column 1, lines 57-61; Column 4, lines 40-44)." While stating the intent of Oota et al. correctly, which is in fact a criticism of the approach taken by Cohen in, for

example, the multi-electrode pair Cohen embodiment of FIG. 6, the Office apparently misapprehends the actual solution of Oota et al. to the stated problem. The Oota et al. solution is to place zigzagged electrode segments of a first electrode (segments $21a - 21n$) one above the other for individual cooperation with a second electrode (outer electrode 14) which extends vertically the entire extent of the first electrode segments. Thus, in Oota et al. there is no area without vertical overlap of the first electrode (electrode segments $21a - 21n$) and the second electrode (outer electrode 14) and the staggering or zigzagging of electrode segments $21a - 21n$ is merely to place portions of what Applicant would term the "first electrode" in closer, and vertically overlapping (see FIG. 2A), proximity to avoid any dead areas where sensing would not take place in cooperation with a laterally adjacent portion of outer electrode 14. Clearly, the combination of Cohen et al. and Oota et al. not only fails to teach or suggest all the elements of claim 1, but the combination of two conflicting approaches to fluid level measurement is inappropriate.

Claims 2, 3 and 4 are allowable as depending from claim 1 and further because the combination of references fails to teach or suggest all the claim limitations with regard to the mutual arrangement of the first and second electrodes, for the reasons set forth above with respect to claim 1. Applicants note that the limitations of each of claims 2, 3 and 4 must be read *in addition to* those of claim 1 from which each depends, and not in isolation.

Claim 4, as presently amended, is further allowable as requiring that the first and second electrodes be both horizontally and vertically spaced from one another.

Claims 5, 6 and 13 are allowable as depending from claim 1.

Claim 14 is allowable as depending from claim 1 and further because the combination of references fails to teach or suggest all the claim limitations, for the reasons set forth above with respect to claim 1. Applicants note that the limitations of claim 14 must be read *in addition to* those of claim 1 from which each depends, and not in isolation.

Claims 16, 17 and 20 are allowable as depending from claim 1.

Obviousness Rejection Based on U.S. Patent No. 5,135,485 to Cohen et al. in View of U.S. Patent No. 4,601,201 to Oota et al. in View of U.S. Patent No. 4,201,085 to Larson

Claims 7, 8, and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cohen et al. (U.S. Patent No. 5,135,485) in view of Oota et al. (U.S. Patent No. 4,601,201), as applied to claim 1 above, and in view of Larson (U.S. Patent No. 4,201,085). Applicants respectfully traverse this rejection, as hereinafter set forth.

The 35 U.S.C. § 103(a) obviousness rejections of claims 7, 8 and 12 are improper because Larson fails to remedy the deficiencies of Cohen et al. and Oota et al. with respect to the latter's failure to meet the claim limitations of claim 1, from which claims 7, 8 and 12 each respectively depend. Thus, the combination of references fails to teach or suggest all of the claim limitations, as required. Accordingly, claims 7, 8 and 12 are not obvious over the combination of Cohen et al., Oota et al. and Larson.

Obviousness Rejection Based on U.S. Patent No. 5,135,485 to Cohen et al. in View of U.S. Patent No. 4,601,201 to Oota et al. in View of U.S. Patent No. 5,406,843 to Hannan et al.

Claims 9 through 11 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cohen et al. (U.S. Patent No. 5,135,485) in view of Oota et al. (U.S. Patent No. 4,601,201), as applied to claim 1 above, and in view of Hannan et al. (U.S. Patent No. 5,406,843). Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants respectfully assert that the Office is inappropriately combining the Hannan et al. reference. Specifically, Col. 9, lines 63-66 discloses providing a *timing* or clock signal of about 2-8 Mhz to controller 16 to time its operation which, as noted at Col. 7, lines 7-37, cited by the Office, consists of "short duration DC pulses" and *not* an oscillating signal. There is no teaching that the *output* of controller 16 as an *input* to the electrodes is within a 2-8 Mhz range. In fact, Hannan et al. is silent on the issue as to what the drive frequency may be. The Col. 5 and Col. 7 citations referenced by the Office do not support the providing of an *oscillating input signal* as required by each of claims 9, 10 and 11, each require providing an oscillating signal to one of the first and second electrodes. Thus, in addition to not remedying the deficiencies of Cohen et al. and Oota et al. with respect to claim 1, Hannan et al. does not, in fact, provide a

teaching or suggestion of the limitations respectively set forth in each of claims 9,10 and 11. The Office has cited two additional references, Kelly and Matzuk for the proposition that oscillating signals and DC pulses are equivalent, or at least that one of ordinary skill in the art would know how the change in signal type would affect device output, but has declined to employ these in a rejection.

Applicants appreciate the additional explanation as to the relevance of Kelly and Matzuk supplied in the Advisory Action, as well as the asserted motivation for employing one type of signal versus another and why one would be motivated to adopt the teachings of Hannan et al. and drive the device of Cohen at the recited frequencies and using a DC pulse signal in lieu of an oscillating signal. However, as noted in a prior response, there is no suggestion or motivation in the references relied upon in the rejection to make the attempted combination since Cohen et al. as well as Oota et al. appear to use an oscillatory input signal while Hannan et al. uses a pulsed input signal and the methods of detection and analysis of the output signals of each of the references are quite different. Further, Applicants respectfully assert that Kelly and Matzuk provide such motivation. In other words, assuming *arguendo*, without admitting, the interchangeability of oscillatory and pulsed signals for the intended application, their mere interchangeability does not detract from the lack of motivation to combine the teachings of the references, since the mere fact that the teachings could be combined is insufficient in the absence of some suggestion that they should be combined.

Obviousness Rejection Based on U.S. Patent No. 5,135,485 to Cohen et al. in View of U.S. Patent No. 4,601,201 to Oota et al. in View of U.S. Patent No. 3,939,360 to Jackson

Claim 18 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Cohen et al. (U.S. Patent No. 5,135,485) in view of Oota et al. (U.S. Patent No. 4,601,201), as applied to claim 1 above, and in view of Jackson (U.S. Patent No. 3,939,360). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 18 is allowable as ultimately depending from claim 1. Jackson fails to remedy the deficiencies of Cohen et al. with respect to claim 1. Further, contrary to the Examiner's assertion, Jackson fails to teach or suggest a thin, insulative film mounting structure for the

electrodes. Rather, the text relied upon in Jackson teaches the use of a plastic or silicone film or smearing petroleum jelly on the exterior of the intravenous bottle *before* applying the electrode assembly—so that moisture on the bottle doesn't short between the electrodes (Col. 8, lines 36-40). Thus, claim 18 is not obvious.

The Office has asserted that, because Jackson teaches application of a thin insulative film to a container where electrodes are to be placed, when the electrodes are so placed the film becomes a mounting structure. Applicants acknowledge this argument but do not concede the propriety thereof, as Applicants are claiming a sensor in and of itself, and not necessarily as affixed to a container.

In any case, claim 18 is allowable as ultimately depending from claim 1.

Obviousness Rejection Based on U.S. Patent No. 5,135,485 to Cohen et al. in View of U.S. Patent No. 4,601,201 to Oota et al. and U.S. Patent No. 3,939,360 to Jackson, and Further in View of U.S. Patent No. 5,051,921 to Paglione

Claim 19 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Cohen et al. (U.S. Patent No. 5,135,485) in view of Oota et al. (U.S. Patent No. 4,601,201) and Jackson (U.S. Patent No. 3,939,360), as applied to claim 18 above, and further in view of Paglione (U.S. Patent No. 5,051,921). Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants note that Paglione employs an electrode assembly disposed within a tank, and therefore in contact with the liquid within the tank. Applicants note that this is also the case with Oota et al. (outer electrode 14). Cohen et al. and Jackson, to the contrary, place their electrode assemblies on the exterior of a container and in isolation from liquid to be measured. Thus, the operative measuring technique is different in Paglione than in the two other references, and there would be no motivation or suggestion to make the asserted combination.

The Office has asserted that Cohen et al. teaches disposition of electrodes within a container. However, the text relating to FIG. 12 (Col. 11, lines 39-57) clearly confirms that "external support container 92" is an external support for the flexible plastic bag 13 *in which the fluid the level of which is to be measured is disposed.* Thus, electrodes 10 and 12, while nominally on the inside of the support container, are nonetheless on the *outside* of flexible plastic

bag 13 in which fluid resides and are pressed against the exterior of the bag by the weight of the fluid in the bag. Accordingly, electrodes 10 and 12 remain in isolation from the fluid.

Withdrawal of the rejection is respectfully requested.

Claim 19 is further allowable as ultimately depending from claim 1.

Obviousness Rejection Based on U.S. Patent No. 5,135,485 to Cohen et al. in View of U.S. Patent No. 4,601,201 to Oota et al. and U.S. Patent No. 5,406,843 to Hannan et al.

Claims 21 through 29 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Cohen et al. (U.S. Patent No. 5,135,485) in view of Oota et al. (U.S. Patent No. 4,601,201) and Hannan et al. (U.S. Patent No. 5,406,843). Applicants respectfully traverse this rejection, as hereinafter set forth.

With respect to claim 21 as proposed to be amended, the combination of Cohen et al. in view of Oota et al. is deficient for the same reasons advanced previously with respect to claim 1. Similarly, Hannan et al. is deficient for the same reasons advanced previously with respect to claims 9-11. Further, as noted previously with respect to claims 9-11, there is no motivation or suggestion to make the attempted combination of Cohen et al., Oota et al. and Hannan et al..

Claim 22 is allowable as depending from claim 21.

Claims 23 and 24 allowable because, as noted previously, Hannan et al. does not supply an oscillating signal of the claimed frequencies as an *input* to the capacitive structure as claimed, but rather uses a timing signal of between 2 and 8 Mhz supplied *to* the controller, which in turn supplies a pulsed, short duration DC input signal of undisclosed frequency to the electrodes.

Claims 25-29 are allowable as depending from claim 21.

ENTRY OF AMENDMENTS

The amendments to claims 1 through 4, 9, 12, 21 and 22 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 1 through 14 and 16 through 29 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,

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